

**A Webinar on
Introduction to Automotive Noise, Vibration and Harshness**

Date: 10th August 2020

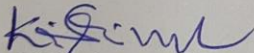
Time: 11.00 am to 1.30 pm


Venue: Mechanical Engineering Department Seminar Hall

A Webinar on "Introduction to Automotive Noise, Vibration and Harshness" was organized by the Department of Mechanical Engineering in association with The Institution of Engineers India Students' Chapters on 10th August 2020 by Dr. M. Jaganmohan Rao, Divisional Manager, NVH Group, R & D Division, Ashok Leyland, Chennai. About 285 Participants were registered from Faculty and Students of 2nd year, 3rd year and 4th Year B.Tech Mechanical Engineering.

The following topics were discussed by the Resource Person through ppts

- Automotive NVH - Future Challenges
- Driving Factors
- Comfortable Noise/sound
- Magnetic field solution - model and vibration
- Vibration in everyday life
- Pass by noise limits for automobiles
- Engine Ranking and contribution analysis
- Powertrain: noise & vibration evaluation
- NVH future challenges


Mr. K. Srinivasa Rao
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 **A Webinar on**
Introduction to Automotive Noise, Vibration and Harshness
10th August 2020
Dr. M.Jaganmohan Rao
Divisional Manager, NVH Group, R&D Division, Ashok Leyland, Chennai.



Organised by
The Institution of Engineers India Students Chapter
Department of Mechanical Engineering
Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada-A.P.

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Automotive NVH – Future Challenges

N- Noise
V- Vibration
H- Harshness

Dr. M Jaganmohan Rao
Head of NVH Testing
ASHOK LEYLAND
TECHNICAL CENTRE
CHENNAI

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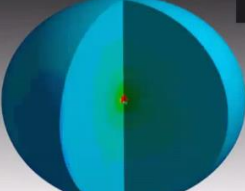
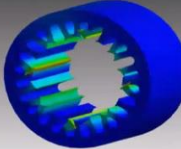
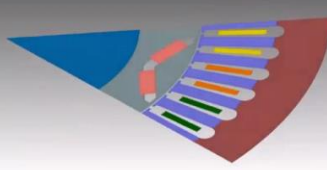
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Magnetic Field Solution

Modal and Vibration



VR Acoustic

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Agenda

1. Introduction
2. Driving factors
3. What /Why is NVH
4. Cause and Effect of Vibration
5. Instrument and Analysis process
6. NVH Product development
7. NVH Product design and validation
8. Systems NVH
9. NVH Main Infrastructure
10. NVH Future challenges

Comfortable Noise/ Sound



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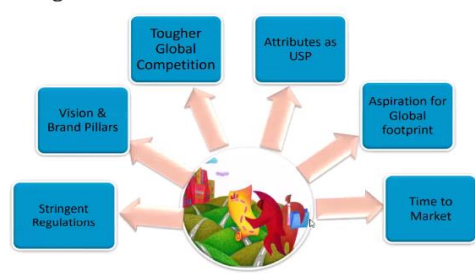
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Driving factors



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Vibration in Everyday Life

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PASS BY NOISE LIMITS FOR AUTOMOBILES

| Class of Vehicles | Category | Ranking |
|-------------------|----------------|---------|
| 1 | 2 Wheelers | 65dB |
| | 40 cc | 70 |
| | 50 cc & 175 cc | 77 |
| 2 | 175 cc | 80 |
| | > 175 cc | 77 |
| 3 | 175 cc | 80 |
| | > 175 cc | 77 |
| | > 175 cc | 77 |
| 4 | 0.5W - 3 ton | 70 |
| | 3 - 3.5 ton | 77 |
| 5 | 3.5 ton | 70 |
| | > 3.5 ton | 77 |
| 6 | > 100 kW | 70 |
| | > 100 kW | 80 |
| | > 75 kW | 77 |
| | 75 - 100 kW | 70 |
| 7 | > 100 kW | 70 |
| | > 100 kW | 80 |

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Engine - Ranking & Contribution analysis:

Powertrain NVH assessment :

| Component | Contribution (%) |
|--------------------|------------------|
| Timing Gear LOUVER | 24% |
| CRANKCASE | 23% |
| FUEL PUMP | 18% |
| PISTON RING | 13% |
| PISTON PIN | 12% |
| PISTON SKIRT | 7% |
| PISTON RING GROOVE | 7% |
| ENERGY MANAGEMENT | 5% |

Intensity mapping of engine giving contribution of components in percentage

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POWERTRAIN: NOISE & VIBRATION EVALUATION

Radiated Noise as per SAE J1974

Torsional Vibration Measurement

Linear Vibration

Typical Results Linear & Torsional Vibration

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NVH Future challenges

- **Drive for light weight designs**
Reduction in weight has an adverse effect on NVH performance. This is due to having less mass and inertia to react forces and lighter designs may also compromise structural performance
- **Electric Vehicles**
Replacement of a traditional internal combustion engine (ICE) with an electric motor intuitively means that noise and vibration levels will be reduced
- **Smaller engines with Higher**
ICE technology has allowed development of smaller engines, with fewer cylinders, and with higher power output
- **Drive to Reduce Lead Times**
Most vehicle manufacturers now offer a large portfolio of vehicles each with many variants and options. Customers expect that new models of these vehicles are also offered frequently.

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